

Claims

1           1. A rubber composition usable for the manufacture of tires, comprising, as base  
2 constituents, a diene elastomer, a white filler as reinforcing filler and a coupling agent  
3 (white filler/elastomer) that links the reinforcing filler and the elastomer, the white filler  
4 comprising a titanium oxide having the following characteristics:

5           (a) it comprises by mass more than 0.5% of a metallic element, other than  
6 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

7           (b) its specific BET surface area is between 20 and 200 m<sup>2</sup>/g;

8           (c) its average particle size (by mass),  $d_w$ , is between 20 and 400 nm; and

9           (d) its disagglomeration rate,  $\alpha$ , measured by the ultrasound disagglomeration  
10 test, at 100% power of a 600-watt ultrasonic probe, is greater than  $2 \times 10^{-2} \mu\text{m}^{-1}/\text{s}.$

1           2. The composition according to Claim 1, wherein the total quantity of  
2 reinforcing filler is between 20 and 400 phr (parts by weight to one hundred parts of  
3 elastomer).

1           3. The composition according to Claim 1, wherein the BET surface area of  
2 the titanium oxide is within a range of 30 to 150 m<sup>2</sup>/g.

1           4. The composition according to Claim 1, wherein the average particle  
2 size  $d_w$  of the titanium oxide is within a range of 30 to 200 nm.

1           5. The composition according to Claim 1, wherein the disagglomeration  
2 rate  $\alpha$  of the titanium oxide is greater than  $5 \times 10^{-2} \mu\text{m}^{-1}/\text{s}.$

1           6. The composition according to Claim 1, wherein the reinforcing white  
2 filler comprises more than 50% by weight titanium oxide.

1           7. The composition according to Claim 1, wherein the total reinforcing white  
2 filler is titanium oxide.

1           8. The composition according to Claim 1, wherein the reinforcing white  
2 filler further comprises silica and/or alumina.

1           9. The composition according to Claim 1, further comprising one or more  
2 carbon blacks as a reinforcing filler.

1           10. The composition according to any of Claims 1 and 9, wherein the quantity  
2 total of reinforcing filler is between 30 and 200 phr.

1           11. The composition according to Claim 1, wherein the quantity of coupling  
2 agent is between  $10^{-7}$  and  $10^{-5}$  mole per square meter of reinforcing white filler.

1           12. The composition according to Claim 11, wherein the quantity of coupling  
2 agent is between  $5 \times 10^{-7}$  and  $5 \times 10^{-6}$  moles per square meter of reinforcing white filler.

1           13. The composition according to Claim 1, wherein the titanium oxide satisfies  
2 one or both of the following characteristics:

- 3           - its BET surface area is within the range of 70 to 140  $\text{m}^2/\text{g}$ ;  
4           - its particle size  $d_w$  is within the range of 50 to 100 nm.

1           14. The composition according to Claim 1, wherein the titanium oxide  
2 satisfies all the following characteristics:

- 3                   - it comprises by mass more than 1% of a metallic element other than
- 4 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;
- 5                   - its BET surface area is within the range of 70 to 140 m<sup>2</sup>/g;
- 6                   - its particle size  $d_w$  is within the range of 50 to 100 nm; and
- 7                   - its disagglomeration rate  $\alpha$  is greater than  $5 \times 10^{-2} \mu\text{m}^{-1}/\text{s}$ .

1           15. The composition according to Claim 1, wherein the coupling agent is a  
2 polysulphurized alkoxysilane.

1           16. The composition according to Claim 1, wherein the diene elastomer is  
2 selected from the group consisting of polybutadienes, polyisoprenes, natural rubber,  
3 butadiene-styrene copolymers, butadiene-isoprene copolymers, butadiene-  
4 acrylonitrile copolymers, isoprene-styrene copolymers, butadiene-styrene-isoprene  
5 copolymers, and mixtures thereof.

1           17. The composition according to Claim 16, wherein the diene elastomer is a  
2 butadiene-styrene copolymer prepared in solution having a styrene content of  
3 between 20% and 30% by weight, a content of vinyl bonds of the butadiene part of  
4 between 15% and 65%, a content of trans-1,4 bonds of between 20% and 75% and a  
5 glass transition temperature of between -20°C and -55°C.

1           18. The composition according to Claim 17, further comprising a  
2 polybutadiene having more than 90% cis-1,4 bonds.

1           19. The composition according to Claim 1, wherein the diene elastomer is an  
2 EPDM copolymer.

1           20. A reinforcing filler comprising a titanium oxide having the following  
2 characteristics:

3           (a) it comprises more than 0.5% by mass of a metallic element other than  
4 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

5           (b) its specific BET surface area is between 20 and 200 m<sup>2</sup>/g;

6           (c) its average particle size (by mass),  $d_w$ , is between 20 and 400 nm; and

7           (d) its disagglomeration rate,  $\alpha$ , measured by the ultrasound  
8 disagglomeration test, at 100% power of a 600-watt ultrasonic probe, is greater than  
9  $2 \times 10^{-2} \mu\text{m}^{-1}/\text{s}$ , wherein the filler reinforces a diene rubber composition usable for  
10 manufacturing tires.

1           21. A process for reinforcing a diene rubber composition usable for the  
2 manufacture of tires, comprising incorporating by mechanical kneading into the  
3 diene rubber composition in an uncured state a titanium oxide having the following  
4 characteristics:

5           (a) it comprises more than 0.5% by mass of a metallic element, other than  
6 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

7           (b) its specific BET surface area is between 20 and 200 m<sup>2</sup>/g;

8           (c) its average particle size (by mass),  $d_w$ , is between 20 and 400 nm; and

9           (d) its disagglomeration rate,  $\alpha$ , measured by the ultrasound

10 disagglomeration test, at 100% power of a 600-watt ultrasonic probe, is greater than

11  $2 \times 10^{-2} \mu\text{m}^{-1}/\text{s}$ .

- 1 22. A rubber article comprising a composition according to Claim 1.
- 1 23. A tire comprising a rubber composition according to Claim 1.
- 1 24. A colored tire comprising a rubber composition according to Claim 1.
- 1 25. A tread for a tire comprising a rubber composition according to Claim 1.
- 1 26. A colored tread for a tire comprising a rubber composition according to
- 2 Claim 1.